Patent claims

1. A method for producing transparent optical elements, the surface of which has reduced interfacial reflection, at least in certain regions,

in which

the respective surface of a reference element which consists of a polymeric material and corresponds to the respective optical element is exposed to the influence of high-energy ions in a vacuum and

in this way an irregular nanostructure with alternately arranged elevations and depressions lying in between is formed on the respective surface;

subsequently, the respective surface is coated with an electrically conducting thin film,

following that a mold with a negative contour which is superposed by the nanostructure is obtained by electrochemical forming and

with such a mold, a nanostructure reducing the interfacial reflection is formed on at least one surface of a transparent optical element by a molding process.

2. The method as claimed in claim 1, characterized in that a reference element with an optically effective surface contour is used.

3. The method as claimed in claim 1 or 2, characterized in that the high-energy ions are generated by means of an argon/oxygen plasma.

4. The method as claimed in one of the preceding claims, characterized in that polymethylmethacrylate, diethylene glycol bis (allylcarbonate) (CR39) or methylmethacrylate-containing polymers are used for the production of the reference element.

5. The method as claimed in one of the preceding claims, characterized in that, by means of the high-energy ions, the elevations of the nanostructure are formed with heights in the range between 30 nm and 210 nm.

6. The method as claimed in one of the preceding claims, characterized in that the average thicknesses of the elevations of the nanostructure are formed in the range between 30 nm and 150 nm.

7. The method as claimed in one of the preceding claims, characterized in that the electrically conducting layer is formed as a thin metal film.

8. The method as claimed in claim 9, characterized in that the electrically conducting layer is formed from gold.

9. The method as claimed in one of the preceding claims, characterized in that the ions impinging on the respective surface have an energy in the range between 100 eV and 160 eV.

10. The method as claimed in one of the preceding claims, characterized in that an ion bombardment of the respective surface is carried out over a time period of between 200 s and 600 s.

11. The method as claimed in one of the preceding claims, characterized in that an ion bombardment is carried out at a pressure below 10^{-3} mbar.

12. The method as claimed in one of the preceding claims, characterized in that the molding of the optical elements takes place by hot embossing or by a plastics injection-molding technique.

13. The method as claimed in one of the preceding claims, characterized in that the molding of the optical elements takes place by extrusion embossing or UV replication.

14. The method as claimed in one of the preceding claims, characterized in that the surface of an optical element is coated with an organic-inorganic hybrid polymer and the nanostructure is formed with a mold on the surface of this hybrid-polymer layer.

15. A mold for producing optical elements produced by a method as claimed in one of claims 1 to 14, characterized in that an irregular nanostructure with alternately arranged elevations and depressions lying in between is formed on a surface, and

the depressions in each case have different depths within an interval between 30 nm and 210 nm.

16. The mold as claimed in claim 15, characterized in that the depressions have an average clear width in the range between 30 nm and 150 nm.

17. The mold as claimed in claim 15 or 16, characterized in that the respective depths and/or thicknesses of depressions are distributed uniformly about a mean value within an interval.

18. The mold as claimed in one of claims 15 to 17, characterized in that it is formed for the production of Fresnel lenses.

19. The mold as claimed in one of claims 15 to 17, characterized in that it is formed for the production of optical windows, optical lenses, lenticular lenses, beam splitters, optical waveguides or optical prisms.

20. The mold as claimed in one of claims 15 to 17, characterized in that it is formed for the production of optically transparent films.

21. The mold as claimed in one of claims 15 to 17, characterized in that it is formed for the production of coverings for displays or for optical indicating elements.